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Health impact assessment in planning: Development of the design for health HIA tools

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ABSTRACT

How can planners more systematically incorporate health concerns into practical planning processes? This paper describes a suite of health impact assessment tools (HIAs) developed specifically for planning practice. Taking an evidence-based approach the tools are designed to fit into existing planning activities. The tools include: a short audit tool, the Preliminary Checklist; a structured participatory workshop, the Rapid HIA; an intermediate health impact assessment, the Threshold Analysis; and a set of Plan Review Checklists. This description provides a basis for future work including assessing tool validity, refining specific tools, and creating alternatives.

1. Introduction

1.1. The need for planning-specific health impact assessment tools

Recently planners have been attempting to foster connections with public health professionals and improve health through planning actions. As issues such as obesity, asthma, noxious pollutants, and mental health concerns have grown in prominence, there is increasing interest in the potential for changes in the built environment to alleviate such problems. The two fields, public health and planning the built environment, share similar roots in the nineteenth and early twentieth century reform movements. Only quite recently, however, has research emerged to fully acknowledge their many important connections. Unprecedented sources of research funding have helped better bridge the planning and health disciplines.

However, city planners lack tools to systematically incorporate health concerns into their work in a way that acknowledges the depth of health research and the needs of practical planning (Burns and Bond, 2008; Higgins et al., 2005). Practical planning work needs simple processes that only minimally add to the workload of already busy professionals. Specially-designed tools can provide a structured format for clearly identifying potential health problems that can be avoided or ameliorated as well as health benefits that can be enhanced. This paper responds to this need by introducing and describing a suite of health impact assessment tools (HIAs) tailored to urban planning practice. Health impact assessments emerged in the 1980s and involve measures, procedures, and tools for assessing the health effects of a policy, program, or project (WHO, 1999; 4; Kemm et al., 2004). The tools presented in this paper take an evidence-based approach that draws closely on research addressing the relationship between health and the built environment. We describe where the tools fit in the landscape of health impact assessment, how they were developed and refined through pilot testing in practical settings, and provide advice on the opportunities and limitations of these tools.

The tools, considered collectively as the Design for Health suite, include two checklists, a participatory workshop, and a more detailed workbook that can be used alone or in combination with the other tools. They are described in more detail in the next section.

This paper responds to calls from within the public health field for developing simpler, more policy-relevant HIAs rather than imposing another assessment layer akin to full environmental impact assessment (Cole et al., 2005), which may or may not formally address health impacts (Canter, 1996; Steinemann, 2000). By outlining how these tools were developed this paper helps those wishing to use or refine them as well as those trying to develop other HIAs. Too often in the planning field tools are developed but not described in detail, although with some exceptions, for example in the area of sustainability (Shane and Graedel, 2000). In contrast the health field is careful about documenting the sources, reliability, and validity of measures (Forsyth et al., 2006) including in the area of HIA (Simpson et al., 2005). By detailing the intellectual histories of the tools, the bases for their specific components and indicators, and where more

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details can be found, the paper provides important information to assess their face validity and modify specific components. Such openness in documenting tool development is an important step in furthering the practice of HIA.

2. Background

2.1. The design for health suite in the context of other HIA tools

In 2006, 19 cities and counties in Minnesota were funded by a health care foundation to integrate health issues into the comprehensive and transportation planning processes. To aid in this process, a team (the authors) was separately funded to provide technical assistance for the cities and counties through a project that became known as Design for Health (DFH). Technical assistance was to provide educational resources and exemplary plan and ordinance language, with services tailored toward the needs of the individual communities. In addition, the team proposed to develop and test HIA tools as a structured method to systematically account for the health impacts of alternative plans, policies, and projects.

HIA methods already existed within the public sphere, represented in various HIA tools used at that time primarily in Europe, Canada, and Asia. The team examined the range of HIA tools already available and also reviewed reports that referred to their HIA processes (WHO, 1999, 3; Kemm and Parry, 2004, 16; Birley, 2002). A separate article addresses this review of HIA practice in more detail (Forsyth et al., in press). The complete range of HIAs include screening HIAs (filters); scoping HIAs (determining issues); desktop or mini HIAs (another term for screening or scoping); rapid assessments (participatory); integrated HIAs (integrated with other impact assessments); intermediate HIAs (more elaborate); and full HIAs (the equivalent of a full environmental impact statement).

These HIA tools emerged in the 1980s and 1990s in several different locales across the globe. They are commonly traced back to efforts to better assess large infrastructure projects in developing countries and to other policies in Northern Europe and Australia in the late 1980s and early 1990s (Kemm et al., 2004; Ahmad, 2004). Public health professionals have been the main proponents of HIA in the U.S. and elsewhere. HIA methods have been applied to assess the effects of proposed health facilities and social programs (e.g., tobacco sales regulations or proposals for an HIV/AIDS counseling program)—topics where planners have little control (Dannenberg et al., 2006, 2008; Forsyth et al., in press). There have also been calls for better-developed HIA methods (Cole et al., 2004, 2005).

Slowly, HIA applications have evolved to include more urban planning related topics, but the majority of *health* impact assessment tools have been developed by those working in the public health field. In 2006 at the outset of the Design for Health project, there were no completed tools available that addressed planning-oriented issues in detail. A set of HIA tools focused specifically on research evidence related to urban planning concerns appeared as a gap to be filled. In the end, the team created a suite of tools including:

- A short audit tool, the Preliminary Checklist, to help determine the need for additional assessment with one or more of the other tools, depending on the local context (DFH, 2007a).
- A structured participatory workshop, the Rapid HIA, modeled on a format popular in Europe but modified for planning applications (DFH, 2007b).
- The Threshold Analysis—a workbook-based tool that uses GIS analyses for a more comprehensive and objective assessment, but remains less burdensome than a full HIA, which would be comparable to a full environmental impact analysis process (DFH, 2007c).
- Plan Review Checklists that, while not part of the core suite of tools, are based on the same evidence, synthesized into a series of questions to evaluate the content of local comprehensive plan elements (DFH, 2007d).

While there were no off-the-shelf tools available there were relevant models, although some were only in draft form (Dannenberg et al., 2006, 268). Key sources used in developing the DFH tools are described later.

3. Methods

3.1. Developing and piloting the tools

Developing the tools was an iterative process. This process is described in more detail below for each tool. Sources documenting the process included daily research logs kept by the project director and some of the research assistants and coordinators, email correspondence among the project team members outlining stages in the drafts, and interim reports on development (often in PowerPoint format). User responses were elicited through interviews conducted with all partner communities (with one exception) and an online survey to gain feedback on the use of materials.

Over the course of the project, the research team collected information from each community five times. Early interviews were one-on-one between project staff and key contacts in the communities and focused on development of the whole range of technical assistance materials. The last two interviews included (almost) the entire core project teams for both the technical assistance provider and partner communities. These later two interviews occurred after the entire HIA suite had been developed, allowing detailed discussion about tools—whether to use them, how to use them, which tool or tools to use, and what parts of the tools were found to be most valuable.[3]

In response to information and needs assessment conducted as part of the above processes, the development team conducted each of the below steps for each of the four HIA tools.

- *Reviewing tool formats* involved examining other available HIA tools. Feedback from communities indicated that tools that could be integrated into a variety of planning processes—participatory and technical—would be more likely to be used.
- *Developing the evidence base for any specific health criteria in the tools*. The foundation for all tools was a review of the literature on nine topics connecting health and the built environment, a list later expanded to 12. Topics were selected because of their relevance to planning practice, the presence of evidence of a relationship between health and the built environment. They include health issues and environmental features or characteristics with health implications. While the team considered biological, behavioral, and social factors to be more important determinants of health than the built environment, in many cases urban planning had limited influence on such dimensions. Instead, the tools focus on areas where urban planners have influence and where there is some evidence of health effects. Topics include: accessibility, air quality, environmental and housing quality, food, mental health, physical activity, safety, social capital, and water quality. Climate change, healthcare facility siting, and noise were topics added later and other issues are under consideration; materials on children, seniors, people with low incomes, and universal design were also reviewed. The tools were created using the first nine topics and updated for the additional topics. “Key Questions”, short 2–4 page papers, summarize available research–what is known and what is up in the air—making it accessible to users of the HIAs. Within what is known

[3] Partnering communities varied in whether their contracts required or encouraged them to use tools; even when required to conduct an HIA with a few exceptions most communities needed considerable prodding to do what they perceived as the additional work of the HIA. A separate assessment of the outcomes of the HIAs is being prepared; this paper explains their development and piloting.

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these summaries specify whether there is a clear numerical *threshold* (such as recommended setbacks from busy roads due to air quality concerns) or a less clear, but still important, *association* (such as the less quantifiable connection between views of green space and stress reduction) (Design for Health, 2008a). The team also reviewed the literature on the social determinants of health (WHO, 2007; Corburn and Bhatia, 2007).
- *Drafting the tools and instructions* involved several drafts of each tool.
- *Internally piloting the tools and revising*, using team members and then other research assistants.
- *Externally piloting the tools and revising* in workshop settings involving planning, public health, parks and recreation, public health staff and elected officials and with partner communities.

3.2. Preliminary Checklist: reviewing tool formats

The DFH Preliminary Checklist is a relatively simple tool mostly performing a screening function. A two-page form provides a score that enables users to assess whether a project or plan is significant enough in size and scope and has enough potential health effects to warrant more analysis. It also has some scoping dimensions to help identify issues or problems for further analysis. Professionals familiar with pertinent information about a proposed project or plan could complete it in a few minutes; for others it will take longer (DFH, 2007a). The checklist drew on several existing tools—those that were particularly relevant are described below. While screening is much discussed as an important type of HIA, in 2006 there were relatively few such tools published even on the extensive web site at the University of Liverpool in England (http://www.liv.ac.uk/hia/) that for some time was a center for resources on HIA.

One of the most relevant available sources was the Commonwealth of Australia's (2001) *Health Impact Assessment Guidelines*. These guidelines include a checklist of criteria about the extent, importance, and organizational relevance of the HIA adapted from earlier sources.[4] Topics include: magnitude of impacts, geographical limits, duration and frequency, cumulative impact, risk, socio-economic importance, people affected, local sensitivity, reversibility, economic costs, and institutional capacity to address the impacts). The report also presents a screening tool based on an application developed by the UK Department of Health in 2000 and covers similar topics (Commonwealth of Australia, 2001, 18, 39–40). Two columns of unweighted answers are provided—more answers in the left column lead to doing an HIA, those in the right column lead to the opposite conclusion. Lessons from this excellent tool included:

- A checklist format efficiently organizes information.
- Going beyond the more obvious connections between health and policy were questions about institutional capacity and the likely influence of an HIA if conducted.
- General questions (e.g., size, cost, reversibility, stage of proposal) are useful in this tool, but it would also be helpful to have a tool that was more focused on planning.

A second model, *The Health and Well-being Screening Checklist* (Devon Health Forum, 2003) is a 16-page manual. Screening is in two stages. First, a three-page matrix is used to organize data: (a) populations affected, (b) potential health impacts, and (c) possible actions in relation to 14 topics including income, employment, children, personal support, sense of control, physical safety, educational opportunities, risk taking, housing, natural environments, built environments, transportation, public services, and health inequalities. Stage two involves 13 questions about the: characteristics of the policy, organizational factors, and health impacts arranged with answers in two unweighted columns like the Australian example—the more answers in the left column, the greater the need for further HIA.

Several lessons that are incorporated into the DFH Preliminary Checklist:

- This checklist combined substantive health topics and policy and organizational factors.
- The explanatory manual, including the resource list of information needs and potential sources, is helpful.
- The specific questions in this tool provide a model for questions focused on social and environmental topics relevant to comprehensive planning.

3.2.1. The Preliminary Checklist: development, drafting, and piloting

The Preliminary Checklist asks two sets of questions, one set on each side of the two-sided sheet (and the tool itself has an accompanying manual). The first page includes seven questions intended to screen a project, plan, or policy in terms whether it is significant enough to assess and whether additional analysis is needed, questions adapted from the models above: geographic extent, reversibility, population or workforce increase, cumulative impact, people affected, land use change, and institutional capacity.

The second page performs a scoping function, asking nine questions about the characteristics of the proposal relative to seven health topics with questions selected because they represented important health effects and also had relatively clear thresholds or criteria for assessing impacts. For example, based on the balance of evidence that suggests the presence of health impacts on residents of neighborhoods and children attending schools located within close proximity to a major auto-related transportation corridor, the checklist asks whether there are residential areas or schools within 200 m of a major transportation corridor.

Each side of the checklist contains questions which are scored zero to two; higher scores suggest more of an impact and are indicative of possible "unhealthy planning." If the score is high enough, a more elaborate HIA is suggested. Even if the score is low, however, the tool may identify areas needing further consideration. A workbook describes basic data needs and where information might be found.

This tool is primarily a desktop exercise. It could also be used in whole or in part in a participatory format, to provoke discussion and build knowledge among participants. It is also designed to be slightly light hearted, akin to a magazine quiz that asks – "should you marry this man?" It can be modified but as it is based on research evidence additional criteria must be based on comparable evidence. The questions in the checklist as developed are unweighted, but weights could be added to reflect local values and conditions. For example, an area with high asthma rates might weight air quality issues more highly.

The tool was first tested with professionals and elected officials from partner communities at a workshop in January 2007 and a training workshop in May 2007. These experiences led to a number of refinements in scoring and question wording, and the addition of a background document to explain the process and sources of data in greater detail. It was then used by seven cities as a preliminary tool (see Table 1). Feedback indicated that it provided information that made sense to people, that is it had face validity. One community, however, added additional questions that were not necessarily backed up by research evidence. Across the seven communities that used the Preliminary Checklist, each determined that no additional analysis of health impacts was needed, thus it was helpful as they made decisions about how and when to move forward in the planning process. None tested the checklist for inter-rater reliability.

3.3. Rapid assessment: reviewing tool formats

Rapid assessments, or structured HIA workshops for an invited but representative group of local stakeholders, are well established in

[4] The manual cites Canter (1996) which is itself cited in Health Canada (2000).

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Table 1
Summary of HIA processes.

Community	Purpose	Lead department	Stakeholder involvement	Timing	Approach to using HIA
Preliminary Checklist HIA					
Carver County	Evaluate citizen petition for environmental impact assessment for proposed rail-based transloading facility	Staff – public health lead, support from planning	None	Prospective	Designated some existing questions for housing and residential projects only; added questions on air quality, and harmony of design with existing community.
Eden Prairie	Proposed town center redevelopment; senior housing project	Staff – planning	City council	Prospective	Used as an evaluation during an onsite tour for elected officials
	Senior housing project	Staff – planning	None	Prospective	Desktop exercise
Excelsior	Comprehensive Plan Update	Staff – planning	None	Prospective	Desktop exercise
Rochester	Complete streets ordinance	Staff – planning	None	Prospective	Desktop exercise, but with public presentation of findings
Shoreview	Comprehensive Plan Update	Staff – planning	None	Prospective	Desktop exercise
St. Louis Park	Sidewalks and trails plan	Staff – planning	None	Prospective	Desktop exercise
Victoria	Proposed downtown expansion project	Staff – planning	None	Prospective	Desktop exercise
Rapid Assessment HIA					
Apple Valley	Comprehensive Plan Update	Staff – planning	None	Prospective	Integrated abbreviated HIA into open house for comprehensive plan update
Bloomington	Proposed trail corridor identified in Alternative Transportation Plan	Staff – public health lead, support from planning and parks and recreation	Staff – public works, police, traffic engineering; school district; traffic and parks commission representatives; cycling advocate	Prospective	Used in coordination with existing advisory committee meeting
Columbia Heights	Bicycle and Pedestrian Mobility Plan, Comprehensive Plan Update	Staff – public works lead, support form planning	Staff – parks and recreation; county highway department, parks department, and transportation management organization; school district	Prospective	Used HIA to explore opportunities to connect health to traditional comprehensive plan content and provide linkages to mobility plan
Threshold Analysis HIA					
Ramsey	Comprehensive Plan Update	Staff – planning	None	Retrospective	Used to evaluate existing comprehensive plan with intent to inform plan update

Europe. Given the often technical character of work in health, an attraction of the format has been its participatory focus (Ahmad, 2004, 2, Greig et al., 2004). The DFH Rapid Assessment workshop is overseen by a steering committee and draws participants from different fields and backgrounds. Participants come to the workshops having read materials about the project and health issues prepared in advance. They draw on this reading, their expertise, and local experience to identify health effects. Participants represent diverse positions and if the workshop participants are not diverse enough, information on other perspectives is collected and distributed in the advance materials. Because of the requirements for diversity and preparation before attending the workshop, the number of participants is typically limited. Ison (2002) provides a model for a 50 person workshop but many Rapid HIAs will have smaller numbers. The workshop itself is less than a full day but comprehensively preparing background materials and writing results takes longer (DFH, 2007b).

In HIA circles what is known as the Merseyside model stands out as the exemplary and most cited tool using this format (Scott-Samuel et al., 2001). *The Merseyside Guidelines for Health Impact Assessment* (Scott-Samuel et al., 2001), is a key document giving a broad, accessible overview. Lessons include:

- Clear worksheets provide an organized way of recording information (e.g. a matrix listing health influences, positive and negative impacts, and level of risk).
- The relatively short, 22-page, document is user friendly while also dealing with conceptual issues such as whether HIA is a science, whether and how to quantify health impacts, and the role of stakeholder values.

Rapid Appraisal Tool for Health Impact Assessment: A Task-Based Approach (Ison, 2002, 2004) is the "11th iteration" of a 160 page manual that divides the Rapid HIA process into 50 separate steps. Lessons from this manual include:

- Using steps to break up the Rapid HIA process is a good organizing tool.
- Examples of data, agendas, etc. can help workshop organizers, although such in-depth guidance on preparing for the HIA assumes a low level of experience with public processes.

3.3.1. The rapid assessment: development, drafting, and piloting

The rapid assessment does not focus on predetermined numerical health targets but rather aims to gather insights from local people, combining these insights with expert knowledge. Development involved simplifying instructions and finding good examples relevant to planning (e.g. agendas, activities, report formats). By the mid-2007 version, the HIA Rapid Assessment toolkit had 14 steps shown in Fig. 1. These have been slightly modified from the rapid assessment document in order to be comprehensible as a stand-alone figure.

Initial piloting of this tool was participatory. The overall format and several specific exercises were presented in an HIA training workshop in May 2007 attended by local government professionals from planning, public health, public works, and parks and recreation. This led to simplifying the document and adding more detail about data needed to conduct the Rapid Assessment both in the document and on the web site. We also adapted some typical planning workshop formats including SWOT (strengths, weaknesses, opportunities, and threats) and a future search model as bases of sample agendas.

The Rapid HIA was used by three of the nineteen partner communities where it helped identify health impacts not previously considered such as the potential effects of a high voltage power line on a corridor being investigated for a pedestrian and bicycle trail. Observation of the rapid assessment processes and comments from

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The Rapid HIA Process

- Step 1: *Screening and scoping*: The HIA sponsor (typically a local government) completes the HIA Preliminary Checklist referred to previously to determine if further assessment is needed.
- Step 2: *Getting people in place for a Rapid HIA:* Several people need to be appointed: an organizer or project manager typically from the sponsoring agency: technical staff to prepare background materials; a steering committee to oversee developing background materials, selecting participants, and reporting results; informants or experts for technical information; and workshop participants to represent key perspectives.
  - The project manager and technical staff do much of the work.
  - The steering committee members identify the range of health topics and constituencies and are potentially key advocates for implementing the results.
  - Workshop participants are carefully identified--the workshop requires RSVPs.
- Step 3: *Identifying the tasks for preparing to do the HIA*, by making a work plan.

Getting Information Together for a Rapid HIA

- Step 4: Doing an *inventory of existing plans and policies* building on typical planning inventories but casting a wider net to plans and policies relevant for health.
- Step 5: Creating a *profile of the area*, again including both planning and health issues.
- Step 6: *Talking with people who are affected, interested or have expertise* but may not be able to come to the rapid assessment.
- Step 7: *Predicting health impacts and figuring out their importance*—a role for the technical staff member.
- Step 8: *Developing alternatives* for assessment in the workshop.
- Step 9: *Preparing and sending materials to workshop participants* including materials about the proposed plan, project, or policy; the local area; key health impacts; and views of those not attending the workshop.

Running the Workshop

- Step 10: *Developing the agenda and specific activities*: workshop questions for identifying and assessing health impacts; examples of health determinants/factors affecting health related to comprehensive planning; plan/project related questions.
- Step 11: *Running the workshop.*

Writing the Results and Moving Forward

- Step 12: *Writing the results in a report*—potentially a short public report and a longer technical report.
- Step 13: *Implementing the results*.
- Step 14: *Evaluating the process*.

Fig. 1. Steps in the rapid HIA process.

users suggest that it was sometimes a bit difficult to initiate discussion among participants, but ultimately the processes were successful in building awareness around health issues. Major challenges have been getting users to take seriously the need for collecting and disseminating information about the project and related health issues *before* participants attend the workshop and having sponsors create accessible versions of the results. Few or no materials were sent prior to the workshops, thus requiring time to be spent on these topics during the meetings.

3.4. Threshold Analysis: reviewing tool formats

The DFH Threshold Analysis represents an intermediate HIA tool that provides a more technical assessment. This tool is described in a 36-page workbook that lists evidence-based thresholds and associations that serve as benchmarks against which users can measure the health impacts of a particular project, plan, or policy.

Two similar tools were available in draft form in 2006. The first tool, LEED-ND was available in two draft editions (U.S. Green Building

Intent	A brief description of the significance of the health topic, including key research findings.
Rationale	A description of the relationship between the health topic and the built environment. **For more information including the justifications of thresholds and associations, please refer to the key questions research summary series online at http://www.designforhealth.net/techassistance/researchsummaries.html**
Requirements	Specifies the plan, policy, or project outcome to be achieved.
Definitions	Additional information about key terms and measures relative to requirements.
Submission	Possible evidence to be used to illustrate consistency with the requirements, often with multiple options provided.
Credits Available	The range of credits or points to be applied to a plan, policy, or project based on the extent to which it meets the requirements. The number of credits specified relates the strength of the research on which the thresholds and associations are based to the magnitude of the health benefit associated with the design of the physical environment. In some situations, there may be exemplary circumstances that may not fully comport with the reasoning of different points, but are beneficial conditions for health in their own right. In these cases we assign bonus points.
Credits Awarded	These may be a sliding scale or else provide alternative ways to achieve the same points.

Fig. 2. Example format for a threshold or association.

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Council, 2005, 2007). The 2007 version of the tool is a 161 page document currently being tested on over 200 pilot projects across the U.S. It complements existing LEED tools focused on the site and building scale by analyzing environmental impacts in a broader neighborhood context. The tool encompasses a wide range of criteria in the categories of smart location and linkage, neighborhood pattern and design, green construction and technology, and innovation and design process. It includes nine prerequisites and 49 criteria ranging from brownfield redevelopment and walkable streets to local food production and solar orientation. The tool addresses a number of issues related to human health based on a background report on this topic (Design, Community et al., 2006), but the emphasis is more focused on ecosystem health and overall sustainability. A point-based scoring system allots points, some on a sliding scale based on performance relative to a standard (e.g. street grid density). A project checklist is available for tracking points (U.S. Green Building Council, 2008). For each of the criteria, the document notes the intent, requirements, and a list of evidence (e.g. maps, site surveys, and calculations) needed. Lessons from LEED-ND include:

- Providing higher points and a sliding scale for some criteria allows flexibility.
- Specifying the intent, requirements, and submittals for each the criteria clarifies what is expected from users.
- The summary checklist helps organize information.

The second tool reviewed in creating the Threshold Analysis was the San Francisco Healthy Development Measurement Tool (HDMT) (San Francisco Department of Public Health, 2007a,b,c; Corburn and Bhatia, 2007). This tool was created and used initially for the Eastern Neighborhoods Community Health Impact Assessment (ENCHIA) in response to concerns about the health impacts of development pressures in this part of San Francisco. The HDMT has been evolving rapidly and was widely launched in 2007, followed by a review by numerous technical experts and city agencies (San Francisco Department of Public Health, 2008; Bhatia and Wenham, 2008). By 2007 the HDMT was presented in an online format along with an abbreviated summary of benchmarks in a checklist form.

The 2007 HDMT is organized around six elements including environmental stewardship, sustainable and safe transportation, social cohesion, public infrastructure/access to goods and services, adequate and healthy housing, and healthy economy. For each of these elements, the tool specifies objectives, followed by 34 indicators and 116 associated benchmarks that serve as measures of health to be assessed by users. The online tool provides information about existing conditions in San Francisco in the form of maps, tables, and narrative descriptions. Scoring evolved from early drafts with yes or no responses to include some scale-type answers. Citations providing the health-based rationale for benchmarks were provided in the online tool, emphasizing potential relationships between development characteristics and health rather than justifying specific thresholds. Lessons drawn from the review of the 2007 HDMT included:

- The range of planning and design characteristics dealt with is instructive, though it is easier for planners to influence some of these characteristics (e.g. residential density) as opposed to others (e.g., provision of on-site childcare services).
- The checklist form makes it easy to track performance.
- The online maps of data provide clear examples of required analyses.
- Providing evidence to support the measures in the tool, which became more substantial over various drafts, allows users to understand and reference the underlying research base and to potentially alter the tool as new evidence is created.

Together, these provide effective tools for evaluating a range of health and environmental impacts, and are both considerably more refined than pilot versions of 2006 (Forsyth et al., in press). Internal discussion indicated an opportunity for a more focused workbook in a format appropriate for those with planning backgrounds. Acknowledging that this tool is most likely to need frequent updating, the development team was divided on how useful it would be.

3.4.1. The Threshold Analysis workbook: developing, drafting, and piloting

The Threshold Analysis is focused on measures for which there are multiple sources of evidence of a relationship between health and the built environment and where planners have influence. As stated above these are typically not the most important determinants of health but they are ones where planning actions can lead to positive or negative effects. Two types of measures are included in the tool – thresholds and associations (Design for Health, 2007c). Thresholds are based on numerical targets specified in the literature e.g., transit use declines noticeably for persons living more than 1200 m from a transit stop (Iacono et al., 2007; Transit Cooperative Research Program, 1995). Associations are also based on evidence but are difficult to quantify e.g., views of green can reduce stress and improve mental health (Moore 1981; Maller et al., 2005; Parsons et al., 1998).

This tool provides a set of indicators measured through GIS. The document is organized by health topic, with relevant thresholds and associations. Each final threshold and association contains a narrative description of the rationale, then an evaluation matrix with seven sections each containing a brief description or space for a credit (Fig. 2). More detailed evidence is supplied in the supplementary research summaries on the project web site.

Additional details about submission requirements are provided in an appendix (e.g. for food access a map showing the location of existing or proposed supermarket or fruit and vegetable stores, and a 1600 m network buffer around each, is required). A summary score sheet documents the credits awarded (see Fig. 3). Scoring includes sliding scales for some thresholds and associations. For others there are several different ways to achieve the same number of points. In addition to the sliding scale, points allocated to particular thresholds and associations vary to give greater weights to those judged by the development team to be under the influence of planners, have greater impacts on human health, and a stronger base of evidence.

The Threshold Analysis was first tested by the authors, with a research assistant applying the workbook to one city. It was then piloted in two other cities with two experienced planners (each with approx 15–20 years experience)—one a doctoral student in planning and one completing her masters in landscape architecture—with data prepared by DFH staff. These two testers provided line by line feedback to refine threshold/association explanations, data needs, and sliding scales (see Fig. 4). We then presented the tools to partner communities in a workshop. The strongest critiques were from rural communities where meeting the transit accessibility thresholds would be difficult. We examined the tools and added bonus points for a rural transit program but the inherent structure remained in place. The thresholds are typically relative (e.g., densities rather than absolute numbers) and can be scaled to different community sizes. One community, the City of Ramsey, used the Threshold Analysis HIA. Key challenges in completing the HIA included confusion regarding how to determine certain distances needed to measure performance on the thresholds, and these topics were clarified in a revised workbook. The City of Ramsey's efforts culminated with a 45-page summary report, complete with analytical maps capable of being incorporated into their final planning document as well as a useful evaluation matrix that identified areas of current strengths and improvement for future policy.

3.4.2. Plan checklists: reviewing tool formats

While not technically an HIA, but rather a planning support tool, plan checklists allow users to assess the elements or sections of a typical comprehensive plan: land use; transportation; water resources; parks and open space; and urbanization, redevelopment, and economic development. In considering approaches to organizing

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Topic, Threshold, or Association	Credits available				Total credits available	Credits awarded
Topic: Accessibility					**18**	
Transit service (Threshold)	9	7	4	2	9	
Transit stops (Threshold)	9	6	3	1*	9	
Access to health care facility (Association)**				2*		
Topic: Air Quality					**1**	
Distance from a freeway for residential uses and uses occupied by children (Threshold)	9	7	4	2*	9	
Polluting uses (Association)	6				6	
Air quality mitigation (Association)	3	1			3	
Topic: Environmental and Housing Quality					**7**	
Minimize exposure to lead (Association)	7				7	
Topic: Food					**12**	
Distance to a supermarket or fruit and vegetable shop (Threshold)	12	8	5	1*	12	
Topic: Mental Health					**7**	
Views of green (Association)	7				7	
Topic: Physical Activity					**12**	
Access to playing areas, parks and trails (Association)	6	3	1	1*	6	
Access to trail system (Association)	6	3	1		6	
Topic: Safety					**12**	
Lighting (Association)	4				4	
Complete streets, traffic calming, and safety features (Association)	8	4			8	
Topic: Social Capital					**2**	
Housing options (Association)	2				2	
Topic: Water Quality					**12**	
Groundwater and drinking water quality (Association)	5	1				
Surface water quality (Threshold)	7	3				
Total Credits--Potential and Awarded					**100**	

* Bonus Point

***Note: Whether something is a threshold or association depends on the strength and specificity of the evidence.*

ons for stress recovery and immunization. *J of Env Psychology* 1998, 18: 113-140.

Fig. 3. HIA Threshold Analysis score sheet.

the plan checklists, existing approaches to integrating health considerations into comprehensive plans were considered (Morris, 2006).

3.4.3. The plan checklists: developing, drafting, and piloting

The plan checklists include a total of 10 pages of questions arranged by typical plan elements (e.g. land use, transportation) that can provoke discussions and reflection among planning staff, public officials, and the wider public. Each question is keyed to one of the main DFH health topics (DFH, 2008a,b,c).

Each topic starts with four questions and reviewers can answer yes, no, and not applicable as well as being able to comment.

- Is there explicit language connecting the plan element to human health?
- Where are there areas where explicit language could be added?
- What other health topics, if any, could be incorporated into this section?
- Is there an implementation plan?

The checklists contain two additional sections, identifying those items "essential" to and "good" for health. To a large extent, the essential items overlap with the content of the Threshold Analysis. Those items noted as good for health are also informed by evidence, but the strength of that evidence is weaker and thus the measures are more akin to best practices. For example, for the land use portion of the checklist, a few of the 22 essential items include:

- Is regular transit service planned for all residential and employment areas (preferably within 1200 m of all residential areas). (Accessibility)
- Are all residential areas, schools, day care facilities, playgrounds and sports fields required to be more than at least 200 m (656 ft) from a major road (AADT>40,000)? (Air Quality)
- Do planning policies for redevelopment include evaluation of lead-bearing substances in exposed surfaces of dwelling units, child care facilities, schools, or recreation facilities used by children? (Environment and Housing)
- Are there plans to ensure that there are supermarkets/fruit and vegetable stores located throughout the municipality? (Food)
- Are complete street, shared street and traffic calming concepts incorporated into the future land use plan? (Safety)

Items noted as good for health include questions about crime prevention though environmental design and specific surface water protection tools. The plan checklists were used by the authors in reviewing the comprehensive plans of 18 of the partner communities as part of the technical assistance effort. Several partners also indicated that they used these tools.

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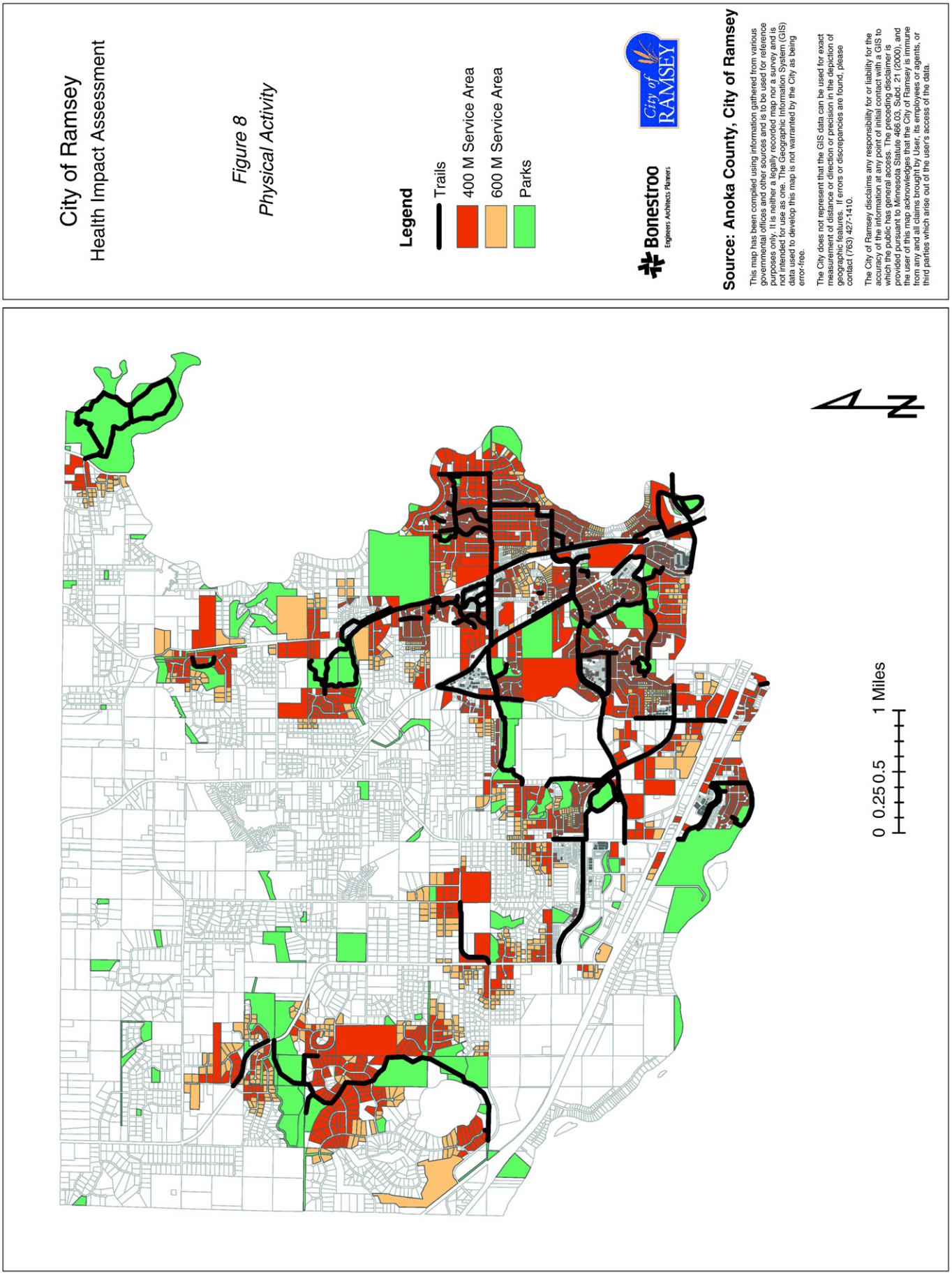

Fig. 4. Example of buffers around trail network—a potential submittal.

4. Conclusion

4.1. Opportunities and limitations for using the tools

This paper responds to calls to create more transparent screening HIA tools, find ways to bring HIA into the policy process, and build up and streamline the body of HIAs (Cole et al., 2005; Elliott and Francis, 2005). By fully elaborating on how the suite of DFH HIA tools were developed, those wishing to use or refine these tools, or create alternatives, have a substantial foundation. Such transparency is a key step in building knowledge and techniques in this area so that HIA can have a stronger role in the planning and policy-making process.

The tools draw on the growing momentum and discussion about opportunities to integrate planning and health concerns, providing practical methods that planners can use to inform plan and ordinance content, evaluate projects and planning outcomes, and strategize about approaches to address health. In general, the tools have several strengths reflecting lessons learned from other HIA tools. The tools:

- Can be used at different stages of the planning process, providing meaningful feedback that can inform planning and design, as well as evaluation and mitigation (Design for Health, 2007e).
- Are accompanied by guidebooks and manuals, informed by user feedback.
- Refer explicitly to research evidence, with measures selected based on the balance of evidence as well as policy or planning relevance.
- Engage different forms of knowledge. The rapid assessment does this most explicitly, tapping local knowledge, but other tools introduce expert knowledge into planning practice. The web site makes evidence widely accessible.
- Provide opportunities to use varied HIA tools to fit in to different timeframes, plan types, and staff capacities.
- Can deal with controversies by helping raise concerns or providing new information from a non-traditional angle.
- Address a wide range of health topics.
- Account for the fact that access to local health-related data is very uneven, meaning some issues are easier to investigate than others.
- Rely on well-known GIS data and expertise.

However, the tools have some limitations and areas for further refinement:

- Their specificity is a strength but also means that, with the exception of the Rapid HIA, they need frequent updating to reflect new research.
- The timing of HIA can be important in the selection of a tool. The cases suggest that prospective use to evaluate a draft plan or proposed project is effective. Using an HIA to evaluate the current plan or existing project area can also be informative but only if the results are used to inform a plan update or project redesign.
- They may still be perceived as an additional burden and need to be further integrated with planning processes, akin to some proposals in the area of sustainability (Keysar, 2005). For example, only one community attempted the Threshold Analysis, perceived as the most work-intensive form of HIA. Only eleven of nineteen partner communities conducted any form of HIA themselves even with technical assistance available. While at least parts of all but one plan or guideline document was evaluated using the Plan Review Checklist, those evaluations were conducted by the technical assistance provider. The issue of perceived burden is a significant one.
- For the Rapid HIA, a skilled facilitator and substantial meeting organization skills are essential when using HIAs in a public process and such skills are rarely present in staff in planning and other departments.
- The Threshold Analysis requires knowledge of GIS, however, agencies have varying levels of capacity. Web-based HIA tools might be created but such development would require a substantial resource commitment.
- Building on the initial testing and refinement, there is a need for additional testing for reliability and validity. While other HIA and impact assessment tools discussed here have not been formally tested in this manner, and the rapid assessment is not amenable to such testing, the use and outcomes of the other objective tools could be evaluated in a broader range of contexts. Specific future tasks include:
- Reliability: The checklist and Threshold Analysis need more extensive testing, beyond the development team, to see if different people come up with the same answers.
- Validity: The tools have face validity—"logical or conceptual validity" often judged by experts (Vogt, 1993 p.89); that is they seem to make sense. This is the main form of validity used in urban planning and design. As planning tools are designed to help alter future actions to improve places, it can also be difficult to test how well they predict health consequences as one point of the tools is to foster action to mitigate negative consequences and enhance negative ones (Baer, 1997). However, more testing would be useful (Petticrew et al., 2007).
- As others have suggested more work is needed to assess the costs and benefits of HIA (Atkinson and Cooke, 2005; Elliott and Francis, 2005). At present, the awareness raising function is important but once awareness has been raised what other benefits can be achieved at what cost?

The HIA tools and the associated plan checklist represent a multi-faceted, evolving approach to incorporate health concerns into planning processes and outcomes. The tools aim to provide a practical and evidence-based approach to more fully engage planners in the emerging knowledge about the connections between health and the built environment. They are useful in and of themselves and the story of their development is important to others seeking to create similar tools for their own specific contexts or incorporate HIA into expert systems and other planning processes.

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